IN THE SPECIFICATION:

Please add the following paragraphs after the paragraph ending on page 11, line 2 of the originally filed application. These paragraphs incorporate essential subject matter from U.S. Patent Application No. 09/542,602 incorporated by reference into the Application. No new matter is added in these paragraphs.

FIG. 6 shows an exemplary distributed network environment 610 in which extensible services are dynamically provided to the subscriber/agents (e.g., 620, 621, 622, 623, 624 and 625) through a network, e.g. an extensible services bus, consisting of the broadband access provider 615, the internet service provider 630, 631, the internet 660, and service offering hosts 650, 651 and 652. As used in the context of Figures 6-8, "agent" is an example of the type of service subscriber used in connection with the present invention, where there are numerous other potential subscriber types, such as client machines, desktop or laptop computers, "thin" terminals, etc. Service mediator machines 640, 641, 642, 643, 644 and 626 are present in the network and establish communications dialogs with agents and other Service mediators for service control within this network. The location of individual machines within the Service Network is established using a dynamically updated service address information element distributed across a framework of standardized interconnection mechanisms (such as described in the co-pending applications referenced above). In such a network, the process of connecting an agent 620 to the services it wants to use must satisfy diverse requirements for performance, flexibility, scalability and manageability. From the perspective of the service host 650 or ISP 630, the flexibility and scalability requirements must be considered foremost, especially on the server side of operations where the number of agent requests per task, and the complexity of the tasks themselves, should be simplified. Embodiments of the present invention

allow for the dynamic addition of new services that meet the rules for the distributed services network (the bus interface rules), whether the service resides at a server machine (e.g., 650), agent machine (e.g., 620), ISP (e.g., 630), within the access network 615 or elsewhere. Likewise, new agents may readily be added to the network. Shown in FIG. 6 is an exemplary embodiment of a distributed services network wherein a certain minimum service functionality is provided to any subscriber, such as agent 620, by way of a registration service 693 for new agents, a login service 692 for existing agents, subscriber profile database services 691, agent connection services 694 and agent management services 690. Through this network, a subscriber (at agent machine 620, for example) can access these services as well as additional services (e.g., new services added to Service Mediator 641 or 642) as they are added to the network. It will be appreciated that the allocations of services in embodiments of the present invention need not follow the distribution across servers illustrated in FIG. 6, but can be regrouped, consolidated or arranged in alternate configurations without departing from the scope of the present invention.

As shown in FIG. 6, the typical user of the distributed services network is an Internet Service Provider ("ISP") 630 using broadband subscriber connections, although the technology is broadly applicable for use on other sites, including remote servers (e.g., 650, 651, 652) or agent machines (e.g., 623). Regardless of where the services reside, it is helpful to think of each of these operating environments as a self-contained functional unit, or a "sphere." For example, there is the ISP Sphere 630, which includes all the hardware at the ISP's site, and the various Subscriber Spheres (e.g., 620, 621, 622), which include the hardware at the subscriber sites. Additional spheres may be connected such as the broadband access provider Sphere (e.g., 615) which includes all networking hardware and service machines needed to provide broadband carriage of data.

Though not shown explicitly in FIG. 6, each subscriber sphere which uses the distributed services network includes a service point map (SPM) functionality that tracks the location and status of services within the distributed services network 610. In an exemplary embodiment, the SPM is the basic unit of communication used to notify agent machines (e.g., 620, 621, 622, 623, 624, 625) of the location of individual service mediator machines (e.g., 640, 641, 642, 643, 644, 626) within the network 610. The SPM mechanism is also used by individual service mediator machines (e.g., 640) to establish the location of other service mediation machines (e.g., 644, 643) within the network 610. The concept of SPM is dynamic and may be tiered to allow extension of basic functionality.

Most of the subscribers (e.g., 620, 621, 622) are likely to be individuals, but many will be connecting internal LANs 629 to the distributed services network 610 via the connection through the gateway or server 626. In the latter case, it may be desirable to host some portion of a service mediator on the subscriber's LAN 629. In this case, the agent machine 626 contains both agent and service mediator functionality. It provides service mediator functionality to the agent machines 624, 625 that are locally connected.

Some of the services that the ISP 630 wants to offer to the subscriber (e.g., 620) may involve direct connections between services that are not part of the distributed services network. These may be traditional services such as SMTP and POP email transport or may be extension to services controlled by the distributed services network 610.

FIG. 7 illustrates a service advertising aspect of an illustrative embodiment of the present invention. As shown in FIG. 7, when a service (e.g., 704) "joins" the distributed services network, it "advertises" itself by "publishing" a listing at a special service on the network. This listing defines what service it provides and where it can be contacted. The form of the service addressing

information used throughout the distributed services network is called a service point map (SPM) 707. Each process in any connected sphere 702, 704 that implements a service has an entry 709, 708 in an SPM 707. The base services have entries in the "Level 1" or "Top Level" SPM. In an exemplary embodiment, the SPM 707 is hosted and maintained by a designated service mediator 706 (e.g., FIG. 6, 640) which is the entry point into the distributed services network for most "join" operations, all base service "joins" and any non-first-time agent "joins."

While several methods of pre-defining the service location exist, two methods are shown in the example of FIG. 7. The content service is identified by a specific IP address and port value pair. The agent profile service is located using a standard URL format and relies of DNS resolution by those seeking service. FIG. 7 also shows the distribution of the SPM across multiple SPM service machines. Upon an update of the SPM by service machine 706, the updated map is forwarded to additional SPM service machines 710 for immediate use.

As shown in FIG. 6, multiple Service Mediator machines may be present, each with their own SPM service 706 for identifying the locations of the various services to the distributed services network. This allows the Service Mediators (e.g., 702) as well as the service machines (e.g., 704) to be partitioned by resource connection as discussed below.

Referring again to FIG. 7, a service (e.g., a content service) begins operations when the server 704 becomes aware that it is supposed to start a server application that implements that service. The server 704 uses the appropriate operating system dependent functions to start registration service. The service constructs an SPM entry for itself during this initialization. The SPM entry contains the service name, version number, and network connection information for the specific instance, or server 704. The SPM entry is submitted to the SPM management service 706 and stored as an entry

708 in the SPM 707, at which time the content service is said to be "active," implying that it is available to service requests.

When a server 704 shuts down, it notifies the SPM service 706 with a list of the SPM entries that it had as "active", and the SPM service 706 removes them from the Level 1 SPM 707. Entries will also be removed in the case that a server becomes unreachable.

In distributed services networks where large numbers of agent instances may be connected at any one time, embodiments of the present invention allow services to be strategically partitioned or distributed to provide scalability to the overall architecture of the network. As described in the co-pending applications incorporated by reference hereto, service point maps are useful for distributing and allocating the available services to any subscribers to the distributed services network. Although various embodiments include "blind" generation and distribution of SPM's to agents (i.e., all SPM entries received from the services are included in the SPM that is distributed to the subscriber machines), embodiments within the scope of the present invention also encompass intelligent generation of SPM's whereby only selected available services are included on an SPM at any given time. Embodiments also allow for intelligent use of the SPM to actively choose or process the selected SPM entry based on service qualification information. For example, available services may be dimensionally partitioned so as to separate the operational tasks into as many discrete and independent code paths as is practically possible. Several such partitioning methods exist, which allow services to be implemented separately on separate servers, allow multiple servers to be implemented on a single server, or allow more than one server to provide a service. Through the use of tiered service location through dynamic SPM generation and dynamic selection from within a specific SPM, services may be partitioned by specific resource requirements, services may be pooled

into equivalent peers for load balancing and services may be selected based upon some real-time element of the data or transaction being processed.

FIG. 8 shows an agent registration aspect used in an illustrative embodiment of the present invention. According to the registration aspect, when a subscriber runs the distributed services agent for the first time, the agent instance establishes its place in the distributed services network by contacting a centralized registration service. This mechanism allows for the agent software to be distributed in a generic form across the entire services network. When the generic agent registers, it may be customized by the service mediator machines as needed. The service mediator may qualify the agent by some means such as network location or user name, and automatically deliver the specific appearance or functionality to that agent instance.

In accordance with the selected embodiments shown in FIG. 8, when an agent 410 is connected to the distributed services network for the first time, the agent instance 410 establishes its place in the network by contacting the registration service server 412. The registration service generates an agent-ID for the new agent instance. The agent-ID value is unique in time and space, so that multiple registration servers can implement the registration service without the need for shared state, thus enabling partitioning by equivalency. The registration service at server 412 then collects a current Level 1 SPM (see SPM 707 in FIG. 7) from the service point map service server (see FIG. 6, SPM service 80) and supplies this to the agent 410. This enables the agent 410 to contact the services identified on the SPM 707, effectively completing the connection process. The SPM selected for the new agent instance is dynamic and may be determined by arbitrary analysis of the agent. This further allows for generic agent software to be distributed across the network and be specifically directed to certain service mediators at the time of registration.

As also shown in FIG. 8, the registration service creates a new entry in the subscriber profile database 817 (see also database 199 in FIG. 6) using the profile creation service 816. The profile created for the agent instance 810 is based upon the agent-ID so the agent will be recognized on subsequent logins. This profile is maintained and extended over the lifetime of the agent such that it reflects the current state and status of that agent and all services to which the agent has subscribed. In addition, any subscriber data that is required for access to the distributed services network may be collected. This "subscriber profile" data is largely customer defined, but it is limited to highly static data such as the subscriber's name and address, the level of service the customer has purchased, and runtime control properties. An example of the last type would be the name and type of the subscriber's mail servers.

The manner of collection of this profile data is flexible in that it can be either pre-registered or collected at installation time. When the pre-registration method is used, a data entry application is used to create the agent's profile and fill it with the information that is available at the time. When the installation takes place, the install process asks the installer for some key data, such as a work order number, or the subscriber's name and address. This key data is used to find the partially completed entry, which is then updated with items such as the agent-ID. Other possible install time data might be subscriber system configuration information.

As shown in FIG. 6, the registration service 693 may optionally use a provisioning data service 681 for retrieving data that was entered about the subscriber prior to the registration of this agent instance. This provisioning service maintains entries that have been prepared during the process of arranging for installation at the subscriber's site such as during the order entry process. The database contains basic network and service related information specific to an individual in the

network. This data is searchable on any field, so the installation tool need only be provided with enough detail to uniquely identify the pre-registered subscriber, e.g. a work order number, a name and address, etc. The provisioning data service 681 may also maintain a connection to the subscriber profile query service 691 so that it can support multiple agent program initializations for a single subscriber. The two common reasons for multiple initializations are that the subscriber is using more than one machine, and when the agent program is reinstalled without using a previously assigned agent-ID.

Once the registration of the agent instance 810 is complete, the registration service 812 also sends an "update" message to the agent connection monitoring service 814 (see also FIG. 6, Connection Management 694) to notify the service that the agent-ID is "active." The database 817 (see also FIG. 6, 699) is updated to reflect the current connectivity status of each individual agent in the network.